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ABSTRACT

The United States Training and Employment Service General Aptitude test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

ED 061319

S-114

TM 001 111

Development of USES Aptitude Test Battery for

Accountant
(profess. & kin.) 160.188

Auditor
(profess. & kin.) 160.188

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U.S. DEPARTMENT OF LABOR
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Washington, D.C. 20210

Technical Report on Development of USES Test Battery

For . . . . . .

Accountant (profess. & kin.) 160.188

Auditor (profess. & kin.) 160.188

S-114

U. S. Employment Service
in Cooperation with
New York and Ohio State Employment Services

January 1967

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

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Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

Frank H. Cassell

Frank H. Cassell, Director
U. S. Employment Service

GATB Studies #708
and 2155

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Accountant (profess. & kin.) 160.188

Auditor (profess. & kin.) 160.188

S-114

This report describes research undertaken for the purpose of validating and cross-validating General Aptitude Test Battery (GATB) norms for the occupations of Accountant (profess. & kin.) 160.188 and Auditor (profess. & kin.) 160.188. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
G - General Learning Ability	105
N - Numerical Aptitude	115

RESEARCH SUMMARY

Sample:

54 (51 male and 3 female) applicants for employment as Auditors in the New York State Employment Service.

Criterion:

Supervisory ratings

Design:

Longitudinal (tests were administered at the time of entry and criterion data were collected at the end of the training period).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, and selective efficiencies.

Predictive Validity:

Phi Coefficient (ϕ) = .41 (P/2 $\angle$.005)

Effectiveness of Norms:

Only 63 percent of the non-test-selected applicants used for this study were good workers; if the applicants had been test-selected with the S-114 norms, 79 percent would have been good workers. 37 percent of the non-test-selected applicants were poor workers; if the applicants had been test-selected with the S-114 norms, only 21 percent would have been poor workers. The effectiveness of the norms is shown graphically in Table I:

TABLE I

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	63%	79%
Poor Workers	37%	21%

VALIDATION SAMPLE DESCRIPTION

Size: N=54

Occupational Status: Applicants

Entry Requirements:

Permanent appointees have passed the Civil Service examination which consisted of a four hour test; provisional appointees are those who did not take the examination or failed it. (The sample included both permanent and provisional employees)

Principal Activities: The job duties of the occupation, and the subjects in the course of study are shown in the Appendix.

TABLE 2

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

	Mean	SD	Range	r
Age (years)#	37.2	9.5	22-62	-.132
Education (years)#	15.9	1.4	12-19	.015
Experience (months)	8.3	2.7	5-15	-.023

#N=53

EXPERIMENTAL TEST BATTERY

All tests of the GATB, B-1002A, except Parts, 9, 10, 11 and 12 were administered during 1955 and 1956.

CRITERION

The criterion data consisted of supervisory ratings made on a descriptive rating scale designed to measure job proficiency for this occupation. Independent ratings were made by the first and second line supervisors.

Rating Scale: The rating scale (see Appendix) consists of four items covering different aspects of job performance. Each item had five alternatives corresponding to different degrees of job proficiency.

Reliability: The correlation between the two ratings was .86. The final criterion score consisted of the combined scores of the two sets of ratings.

Criterion Score Distribution:

Possible Range:	8-40
Actual Range:	8-31
Mean:	19.0
Standard Deviation:	6.0

Criterion Dichotomy: The criterion distribution was dichotomized into high and low groups by placing 37% of the sample in the low group to correspond with the percentage of students considered unsatisfactory or marginal. Workers in the high group were designated as "good workers" and those in the low group as "poor workers". The criterion critical score was 17.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes G, V, N, P and Q were considered for inclusion in the norms. Tables 3, 4 and 5 show the results of the qualitative and statistical analysis.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
G - General Learning Ability	Necessary to learn and understand procedures and practices; to analyze current and regulatory problems affecting auditing procedures; to learn and understand the principles of accounting and to evaluate accounting and record systems.

V - Verbal Aptitude — Necessary to understand verbal material in course work and on the job; to write reports of the results of investigations and audits.

N - Numerical Aptitude — Necessary to understand basic arithmetic principles and to apply them to specific accounting and auditing problems.

Q - Clerical Perception — Necessary to identify verbal and numerical discrepancies in reports and tables; to avoid perceptual errors in computation and transcription in course work and on the job.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitude	Mean	SD	Range	r
G - General Learning Ability	114.8	10.7	85-136	.432**
V - Verbal Aptitude	114.5	10.4	86-133	.287*
N - Numerical Aptitude	118.1	13.1	90-141	.443**
S-- Spatial Aptitude	95.7	16.6	55-133	.252
P - Form Perception	92.5	14.1	64-126	.335*
Q - Clerical Perception	114.3	14.9	86-161	.432**
K - Motor Coordination	107.8	18.2	70-148	.119

*Significant at the .05 level
**Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X	X	X			X			
Irrelevant									
Relatively High Mean	X	X	X			X			
Relatively Low Standard Dev.	X	X	X		X				
Significant Correlation with Criterion	X	X	X		X	X			
Aptitudes to be Considered for Trial Norms	G	V	N		P	Q			

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of Aptitudes G, V, N, P and Q at trial cutting scores were able to differentiate between the 63% of the sample considered good workers and the 37% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about 1/3 of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores slightly higher than one standard deviation below the mean will eliminate about 1/3 of the sample; for four-aptitude trial norms, cutting scores slightly lower than one standard deviation below the mean will eliminate about 1/3 of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of G-105 and N-115 provided the highest degree of differentiation for the occupations of Accountant 160.188 and Auditor 160.188. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .41 (statistically significant at the .005 level).

TABLE 6

Predictive Validity of Test Norms
G-105, N-115

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	8	26	34
Poor Workers	13	7	20
Total	21	33	54

Phi Coefficient (ϕ) = .41 Chi Square (X^2) = 9.12
Significance Level = P/2 $\angle$.005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupations studied into OAP-2 which is shown in Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .40 is obtained with minimum aptitude norms of G-115, N-115 and Q-105.

GATB Study #708 S-114

Accountant (profess. & kin.) 160.188

Check Study Research Summary

Sample:

30 Senior Accounting majors at Kent State University

TABLE 7

Equivalent B-1002 Means, Standard Deviations and Pearson Product-Moment Correlations with the Criteria of Accounting Grade Point Averages (r_1) and Total Grade Point Averages (r_2) for Age and the Aptitudes of the GATB Cross Validation Sample

	Mean	SD	Range	r_1	r_2
Age	21.3	2.9	19-35	-.022	—
(Since this sample consists of college Seniors, education and experience data are not shown)					
G - General Learning Ability	123	13	94-152	.506**	.489**
V - Verbal Aptitude	116	15	87-144	.298	.408*
N - Numerical Aptitude	125	12	96-153	.676**	.524**
S - Spatial Aptitude	115	19	80-156	.252	.192
P - Form Perception	119	15	98-147	.024	.003
Q - Clerical Perception	115	15	82-157	.235	.177
K - Motor Coordination	118	15	78-135	-.022	.098

Criteria:

Accounting grade-point averages and total grade-point averages. (A multiple hurdle on accounting grade-point averages and total grade-point averages was used as the basis for forming the criterion dichotomy.)

Design:

Longitudinal (tests were administered at the beginning of the Accounting course and criteria data were collected at the completion of course).

Principal Activities:

The job duties and the occupation and course of study are shown in the Appendix.

Predictive Validity:

Phi Coefficient = .64 ($p/2 < .0005$)

TABLE 8

Predictive Validity of B-1001 S-114 Test Norms

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Students	1	21	22
Poor Students	5	3	8
Total	6	24	30

Phi Coefficient (Ø) = .64
Significance Level = P/2 $\angle$.0005

Chi Square (X^2) = 12.33

Effectiveness of Norms:

Only 63% of the non-test-selected students in this sample were good students; if the students had been tested with the S-114 norms, 88% would have been good students. 37% of the non-test-selected students in this sample were poor students; if the students had been test-selected with the S-114 norms, only 12% would have been poor students. The effectiveness of the norms when applied to this independent sample is shown graphically in Table 9:

TABLE 9

Effectiveness of S-114 Norms on the Check Study Sample

	Without Tests	With Tests
Good Students	63%	88%
Poor Students	37%	12%

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Validation Sample)

Please work with only one item at a time, and rate each person on it before going on to the next item.

---

1. How good is the quality of his work?
   a) Tends to produce work that is inferior with respect to quality..... ☐ ☐ ☐ ☐ ☐

   b) Not too bad, but still a little below par in producing really high quality work..... ☐ ☐ ☐ ☐ ☐

   c) As good as the general run of workers on this job... ☐ ☐ ☐ ☐ ☐

   d) Not outstanding as this work goes, but has demonstrated above average ability to meet acceptable standards..... ☐ ☐ ☐ ☐ ☐

   e) The quality of his work shows outstanding ability to produce the desired effect in the finished product..... ☐ ☐ ☐ ☐ ☐

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2. How much work does he get done?
   a) A slow worker -- has a low output. Takes much more time than should be needed to finish assignments..... ☐ ☐ ☐ ☐ ☐

   b) Not real slow, but definitely limited in the amount he can complete..... ☐ ☐ ☐ ☐ ☐

   c) Completes an acceptable amount of work in the expected time, although not as fast as many workers on this job..... ☐ ☐ ☐ ☐ ☐

   d) Is faster than most workers in this job -- capable of completing more than the usual amount of work..... ☐ ☐ ☐ ☐ ☐

   e) Very fast worker -- capable of an unusually high output ..... ☐ ☐ ☐ ☐ ☐

3. <u>How carefully does he check the material he works with?</u>
   a) Unreliable, often fails to catch imperfections..... ☐ ☐ ☐ ☐ ☐
   b) Fairly reliable, but could be more careful..... ☐ ☐ ☐ ☐ ☐
   c) Satisfactory -- catches most of the imperfections in the work he handles..... ☐ ☐ ☐ ☐ ☐
   d) Quite observant -- catches almost all imperfections except those difficult to spot..... ☐ ☐ ☐ ☐ ☐
   e) Highly reliable - detects even the most unusual imperfections and those very difficult to spot..... ☐ ☐ ☐ ☐ ☐

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4. <u>When something different comes up, how well does the worker cope with it?</u>
   a) All too often has difficulty in figuring out what to do..... ☐ ☐ ☐ ☐ ☐
   b) Able to make necessary adjustments for minor difficulties. Needs some kind of help pretty often..... ☐ ☐ ☐ ☐ ☐
   c) Able to proceed adequately a fair share of the time unless the situation is unusually new..... ☐ ☐ ☐ ☐ ☐
   d) Able to handle new situations better than the average worker..... ☐ ☐ ☐ ☐ ☐
   e) Always capable of going ahead and meeting even the most complex difficulties that may arise..... ☐ ☐ ☐ ☐ ☐

January 1967 S-114

FACT SHEET

Job Title: Auditor (profess. & kin.) 160.188

Job Summary: Examines and vouches for accuracy and completeness of bookkeeping records of an establishment: Inspects items in books of original entry, such as the daybook or journal, to insure proper recording of transactions. Reviews postings to verify transfer of journal entries to the ledger. Counts cash on hand, and checks amount with bank balance. Inspects and verifies notes receivable and payable, and negotiatable securities. Examines cancelled checks to authenticate amounts, signatures, cancellations, and dates of entry into cash book. Verifies journal and ledger entries for cash payments, purchases, expenses, and trial balances. Examines and authenticates inventory items. Checks arithmetic totals for accuracy. May prepare financial statements for client, such as profit-and-loss statements and balance sheets. May prepare detailed reports, showing items such as operating costs, total assets, liabilities, volume of sales, net profits, and depreciation costs. May work independently or supervise others in performing routine phases of audit.

Cross-Validation Sample

Job Title: Accountant (profess. & kin.) 160.188

Job Summary: Devises, installs, and supervises operation of general-accounting, budget, and cost systems: Supervises subordinates engaged in maintenance of accounts and records. Balances books periodically, and prepares statements for administrative officers, showing items such as receipts, disbursements, expenses, and profit and loss. Prepares Federal, State, or local tax returns. Interprets accounts and records for administrative officers.

Course Description (Accounting)

Principles of Accounting: Introduction to principles of accounting by statement approach and their application to a single proprietorship.

Principles of Accounting: Basic principles of accounting appleid to partnership and corporation.

Intermediate Accounting: Problem course dealing with assets, investments, funds and comparative statements.

Retail Accounting: Accounting for the retail store.

Cost Accounting: Introductory course in accounting for manufacturing costs.

Advanced Cost Accounting: Methods and trends in costing based on standard costs in manufacturing industries; study of debatable terms.

Budgets and Budgetary Control: Accounting procedure for budgetary control.

Advanced Accounting: Problem course including organization, operation, dissolution and liquidation of partnership, consolidated balance sheets, surplus and income statements.

Income Tax Accounting: Income tax law applied in hypothetical cases. Practice in preparation of tax returns for individuals, partnerships, corporations.

Governmental Accounting: Application of principles of accounting and budgeting to municipal, state and federal governments.

Advanced Tax Accounting: Analysis of estate taxes, gift taxes, social security regulations, unemployment compensation, corporation taxes.

Auditing: Procedures and practice developed through lectures and hypothetical audit papers and reports.

Advanced Auditing: Analysis of current and regulatory problems affecting auditing procedures. Emphasis is placed on specialized investigative procedures required for the proper analysis of corporate records and reports.

Analysis of Financial Statements: Balance sheet, profit and loss statement; analysis of problems from viewpoint of management.

Advanced Accounting Problems: Solutions and analysis of accounting problems from American Institute examinations and business sources.

Accounting Systems: Accounting forms and procedures including machine accounting. Accounting systems and methods.

Business Law for the Accountant: Study of law as it affects the practice of accountancy, including legal responsibility and ethics. Attention is given to problems taken from recent examinations of the American Institute of Accountants.

Seminar in Accounting: Open only to seniors or graduates majoring in accounting.

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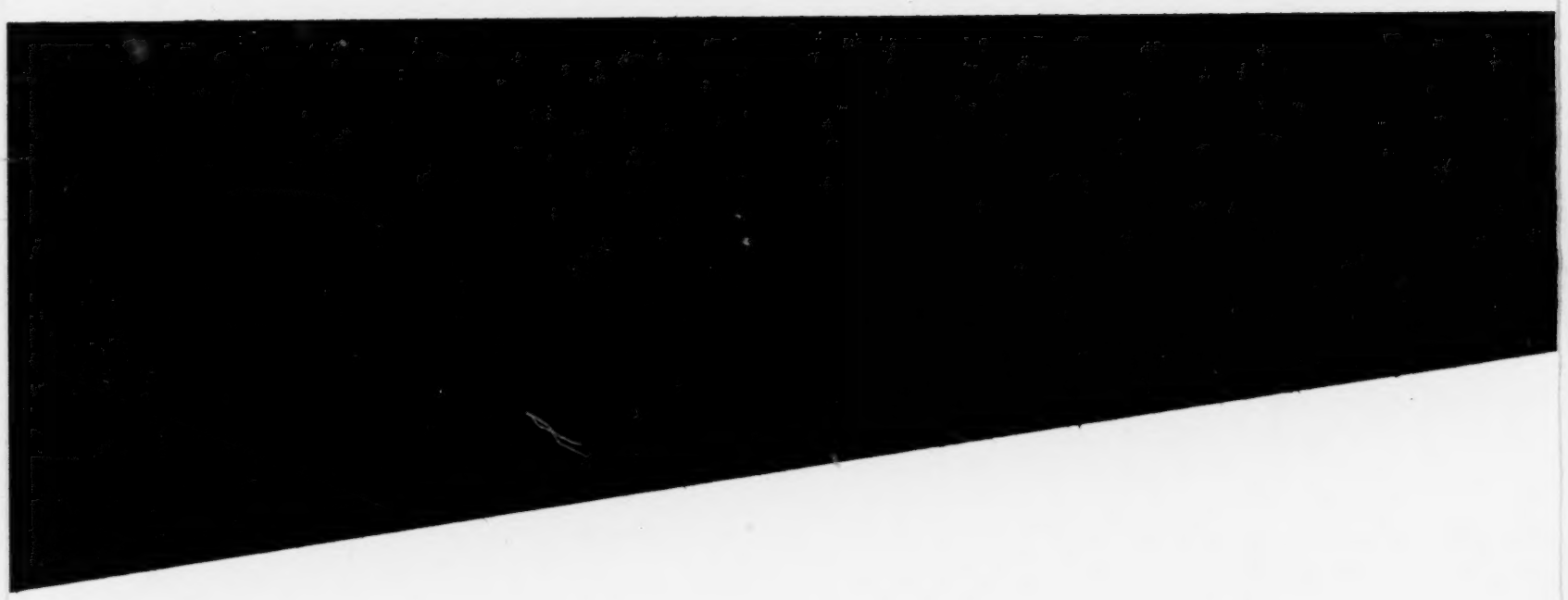

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